

## Cold Row™ Chilled Water (CW) Engineering Manual

**This precision data center air-conditioning system uses the latest, state-of-the-art control technology.**



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## 1. About the Cold Row CW

Designed for scalability, reliability, and seamless integration into new or existing data centers; the rack cooling systems are suitable for use in open and contained hot-aisle and cold-aisle configurations. The models covered in this manual are ideal for hot-spot cooling in small- to enterprise-size data centers.

Typical applications include:

- Internet/Web hosting
- Telecommunications
- Financial/banking
- Insurance
- Airlines/mass transit
- Legal services
- Entertainment
- Government
- Colleges/universities
- Data centers
- Computer/LAN rooms
- Telecommunications rooms
- Co-location centers
- Internet service providers (ISPs)
- Applications service providers (ASPs)
- Hospital operating and isolation rooms

## 2. Features

Chilled water (CW) is supplied to the Cold Row CW unit via a building chiller or other chilled water plant. Chilled water has high affinity for heat, making it a very efficient cooling method. The E<sup>2</sup> controller enables independent valve and fan control so the unit can adjust immediately, and precisely, to varying heat loads and optimize energy efficiency.

Two models are available:

Table 2-1. Available models.

Product Code	Product Name
CRCW-12	Cold Row CW, 12"
CRCW-24	Cold Row CW, 24"

The Cold Row CW offers the following features:

- Highest cooling capacities in the industry.
- 12" and 24" cabinet width.
- 3 EC fans: Independently and infinitely adjustable EC fans ensure maximum efficiency.
- Used in containment, open architecture, and hot spot reduction applications.
- Adapts to both high- and low-density IT environments.
- Wide range of cooling capacities available.
- 100% front and rear service access.
- Adapts to all major manufacturers' racks and rack containment systems.
- Integrates seamlessly with all Building Management Systems (BMS) platforms.
- Private VLAN (pLAN) link to 8 units without a BMS.
- High airflow with low noise.
- Built-in redundancy and capacity assist functions.
- Top and bottom piping options.
- Casters and leveling feet included.
- Indoor use only.
- Installation on raised and non-raised floors.

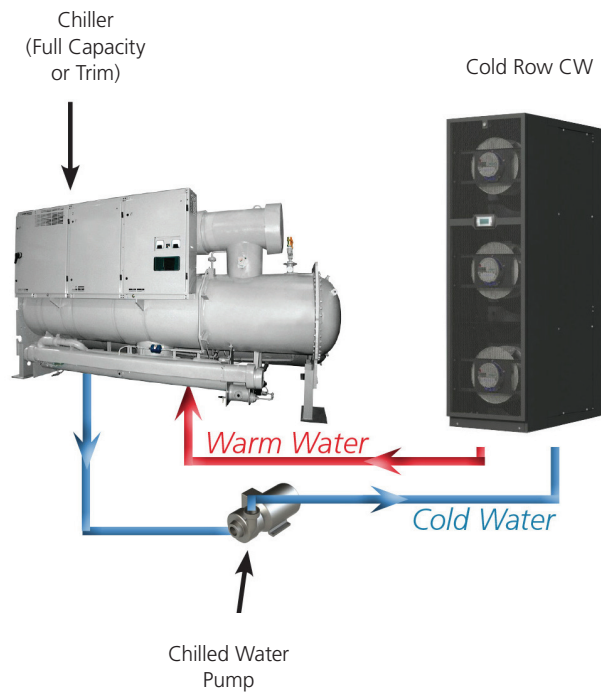


Figure 2-1. Traditional cooling example.

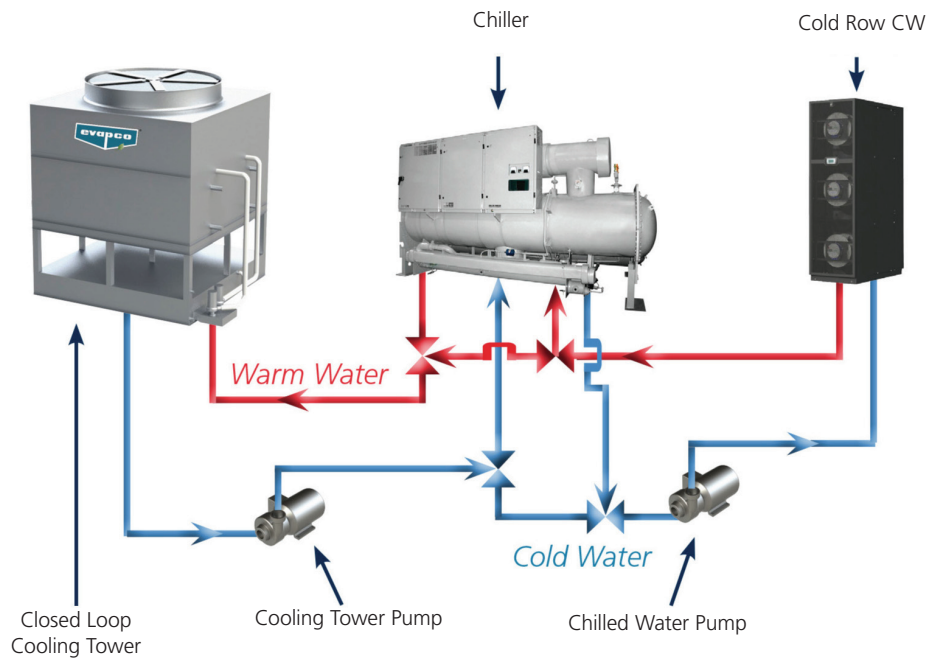
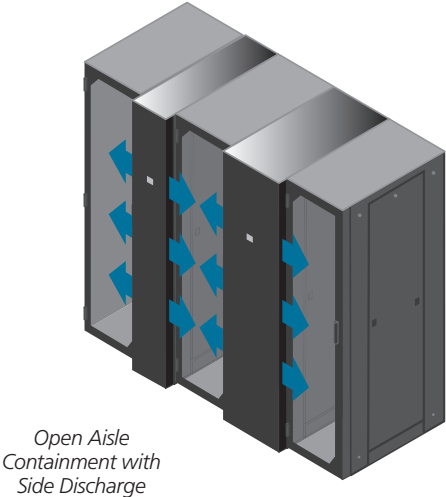


Figure 2-2. Hybrid-free cooling diagram.

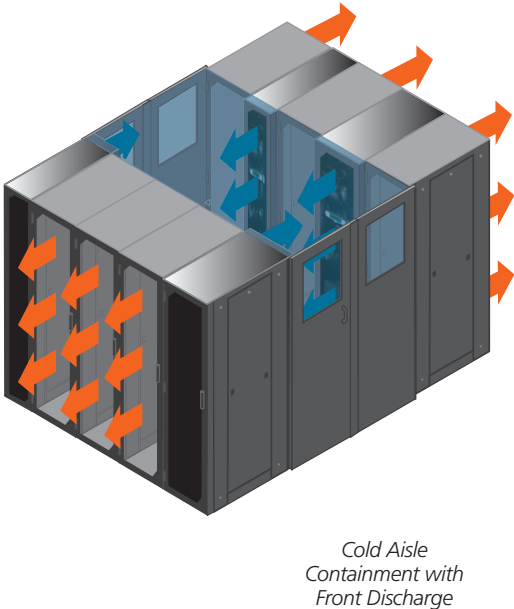
### 3. Configurations Open Aisle Configuration

Open aisle configuration organizes racks in a single row or in hot and cold aisle rows, but without containment. The Cold Row CW draws hot air from the external environment or hot aisle, removes the heat, and supplies cooled air to the front of IT equipment in the cold aisle.



### Cold Aisle Containment

Cold aisle containment captures cooled air from the Cold Row CW and prevents it from mixing with hot air. The front of IT equipment is accessed in the contained cold aisle. The Cold Row CW draws hot air from the external environment, removes the heat, and supplies cooled air back into the contained cold aisle.



# Chapter 4: Technical Data

## 4. Technical Data

Table 4-1. CW System Technical Data.

Model	12" Chilled Water, CRCW-12	24" Chilled Water, CRCW-24
<b>Chilled Water Control Valve</b>		
<b>2-Way (Standard) — Modulating</b>		
Valve Pressure Rating — psi	400	400
Close-off Pressure Rating — psi	200	200
<b>3-Way (optional) — Modulating</b>		
Valve Pressure Rating — psi	400	400
Close-off Pressure Rating — psi	200	200
<b>Chilled Water Coil — Aluminum Fin, Copper Tube</b>		
Rows/Face Area (ft. <sup>2</sup> )	4/5.8	4/11.6
Face Velocity, fpm	500	500
<b>Blower/Motor — Backward Curved Direction Driven EC</b>		
Horsepower (Each)	1/4 H.P.	1-1/4 H.P.
CFM	2,900*	5,800
Quantity of Blowers	3	3
Drive Method	Direct	Direct
<b>Humidification: Electrode Steam Canister Humidifier with Adjustable Output (Optional)</b>		
lb./hr. (KW input)	N/A	5 (1.7)
Std Control	N/A	Proportional
<b>Washable Filters</b>		
Nom. Size (in.) (Qty,)	10.5 x 37.38 x 0.43 (2)	22.0 x 37.37 x 0.43 (2)
<b>Connection Sizes (Copper)</b>		
Condensate Drain (w/pump)	1/2" FPT	1/2" FPT
Humidifier Inlet	N/A	1/4" OD
Water In/Out	1-1/4" NPT	1-1/2" NPT
<b>Physical Data</b>		
Approx. Weight (lb.)	384	550
Dimensions: (H" x W" x D")	78.5" x 11.6" x 42.1"	78.5" x 23.4" x 42.1"
Approx. Shipping Weight	570	711
Approx. Shipping Dimensions: (H" x W" x D")	84" x 22" x 48"	84" x 32" x 48"

\*NOTE: When 110v/Ph/60 Hz power input is selected, unit airflow is reduced by 200 CFM, which will result in capacity reduction of 3.5% or less.



5. Performance, Electrical, and Sound Data

Table 5-1. Performance Data.

12" Chilled Water (CRCW-12)	Temperature Change	Total Capacity		Sensible Capacity		Flow Rate	Total System Pressure Drop
		BTU/H	kW	BTU/H	kW	GPM	(ft. H <sub>2</sub> O)
<b>100° F DB/69.2° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	127,008	37.2	125,200	36.7	25.7	18.0
	12° F Temperature change	119,461	35.0	119,461	35.0	20.2	12.2
45° F EWT	10° F Temperature change	107,333	31.4	107,333	31.4	21.8	13.7
	12° F Temperature change	102,855	30.1	102,855	30.1	17.4	9.6
50° F EWT	10° F Temperature change	95,717	28.0	95,717	28.0	19.5	11.4
	12° F Temperature change	91,561	26.8	91,561	26.8	15.5	8.0
<b>95 FDB/67.7° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	116,107	34.0	113,554	33.2	23.5	15.5
	12° F Temperature change	108,271	31.7	108,271	31.7	18.3	10.5
45° F EWT	10° F Temperature change	96,465	28.2	96,465	28.2	19.6	11.6
	12° F Temperature change	91,834	26.9	91,834	26.9	15.6	8.2
50° F EWT	10° F Temperature change	84,669	24.8	84,669	24.8	17.3	9.5
	12° F Temperature change	80,417	23.5	80,417	23.5	13.7	6.8
<b>90° F DB/66.1° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	108,988	31.9	108,988	31.9	22.1	14.0
	12° F Temperature change	103,324	30.3	103,324	30.3	17.5	9.7
45° F EWT	10° F Temperature change	96,139	28.2	96,139	28.2	19.5	11.5
	12° F Temperature change	91,959	26.9	91,959	26.9	15.6	8.2
50° F EWT	10° F Temperature change	84,788	24.8	84,788	24.8	17.3	9.5
	12° F Temperature change	80,524	23.6	80,524	23.6	13.7	6.8

Table 5-1 (continued). Performance Data.

12" Chilled Water (CRCW-12)	Temperature Change	Total Capacity		Sensible Capacity		Flow Rate	Total System Pressure Drop
		BTU/H	kW	BTU/H	kW	GPM	(ft. H <sub>2</sub> O)
<b>80° F DB/64.5° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	81,155	23.8	77,151	22.6	16.6	9.0
	12° F Temperature change	72,250	21.2	72,250	21.2	12.3	6.0
45° F EWT	10° F Temperature change	61,703	18.1	61,703	18.1	12.6	6.2
	12° F Temperature change	56,587	16.6	56,587	16.6	9.7	4.5
50° F EWT	10° F Temperature change	49,488	14.5	49,488	14.5	10.2	4.8
	12° F Temperature change	44,393	13.0	33,393	13.0	7.7	3.7
<b>24" Chilled Water (CRCW-24)</b>							
24" Chilled Water (CRCW-24)	Temperature Change	Total Capacity		Sensible Capacity		Flow Rate	Total System Pressure Drop
		BTU/H	kW	BTU/H	kW	GPM	(ft. H <sub>2</sub> O)
<b>100° F DB/69.2° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	263,192	77.1	250,429	73.3	54.5	39.4
	12° F Temperature change	251,539	73.7	245,539	71.9	43.5	26.8
45° F EWT	10° F Temperature change	219,854	64.4	219,854	64.4	45.9	29.2
	12° F Temperature change	211,927	62.1	211,927	62.1	37.0	20.2
50° F EWT	10° F Temperature change	192,259	56.3	192,259	56.3	40.5	23.4
	12° F Temperature change	186,556	54.6	186,556	54.6	32.8	16.5
<b>95° F DB/67.7° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	242,729	71.1	227,717	66.7	50.5	34.8
	12° F Temperature change	230,726	67.6	222,663	65.2	40.1	23.3
45° F EWT	10° F Temperature change	199,089	58.3	199,089	58.3	41.8	24.9
	12° F Temperature change	190,287	55.7	190,287	55.7	33.4	17.0
50° F EWT	10° F Temperature change	170,772	50.0	170,772	50.0	36.2	19.4
	12° F Temperature change	164,228	48.1	164,228	48.1	29.0	13.4

Table 5-1 (continued). Performance Data.

24" Chilled Water (CRCW-24)	Temperature Change	Total Capacity		Sensible Capacity		Flow Rate	Total System Pressure Drop
		BTU/H	kW	BTU/H	kW	GPM	(ft. H <sub>2</sub> O)
<b>90° F DB/66.1° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	221,108	64.7	204,623	59.9	46.2	29.8
	12° F Temperature change	207,922	60.9	199,053	58.3	36.2	19.6
45° F EWT	10° F Temperature change	177,357	51.9	177,357	51.9	37.4	20.3
	12° F Temperature change	167,355	49.0	167,355	49.0	29.5	14.0
50° F EWT	10° F Temperature change	148,407	43.5	148,407	43.5	31.6	15.4
	12° F Temperature change	141,408	41.4	141,408	41.4	25.2	10.8
<b>85° F DB/64.5° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	199,491	58.4	180,880	53.0	41.8	25.0
	12° F Temperature change	184,737	54.1	174,604	51.1	32.4	16.3
45° F EWT	10° F Temperature change	154,771	45.3	154,771	45.3	32.9	16.7
	12° F Temperature change	144,039	42.2	144,039	42.2	25.6	11.1
50° F EWT	10° F Temperature change	125,357	36.7	125,357	36.7	27.0	12.1
	12° F Temperature change	117,882	34.5	117,882	34.5	21.3	8.5
<b>80° F DB/62.8° F WB Entering Air Temperature</b>							
40° F EWT	10° F Temperature change	176,442	51.7	156,565	45.8	37.2	20.6
	12° F Temperature change	159,804	46.8	149,444	43.8	28.2	13.0
45° F EWT	10° F Temperature change	130,953	38.3	130,953	38.3	28.2	12.9
	12° F Temperature change	119,742	35.1	119,742	35.1	21.6	8.7
50° F EWT	10° F Temperature change	101,625	29.8	101,625	29.5	22.3	9.0
	12° F Temperature change	93,093	27.3	93,093	27.3	17.1	6.3

## Chapter 5: Performance, Electrical, and Sound Data

Table 5-2. Electrical Data.

Electrical Data	CRCW-12			CRCW-24		
	FLA	MCA	MFS	FLA	MCA	MFS
<b>Cooling Only</b>						
120/1/60	9.5	11.9	15	N/A	N/A	N/A
208/1/60	5.7	7.1	15	N/A	N/A	N/A
208/3/60	5.7	7.1	15	10.0	12.5	15
460/3/60	2.8	3.6	15	4.8	6.0	15
575/3/60	2.3	2.9	15	3.9	4.9	15s
<b>Cooling and Humidifier</b>						
120/1/60	N/A	N/A	N/A	N/A	N/A	N/A
208/1/60	N/A	N/A	N/A	N/A	N/A	N/A
208/3/60	N/A	N/A	N/A	19.2	24.0	30
460/3/60	N/A	N/A	N/A	9.0	11.2	15
575/3/60	N/A	N/A	N/A	7.3	9.1	15

NOTE: Standard 1 KAIC rating; optional 65 KAIC rating available.

Table 5-3. Sound Data.

Sound Data for CRCW-12		Sound Pressure — LpA, free field (dBA) in a 121.13 ft. <sup>2</sup> (3.43 m <sup>3</sup> ) room at 3.28 (1.0 m) distance									
Fan Speed %	Airflow (SCFM)	63	125	250	500	1000	2000	4000	8000	Total dBA	NR Value
50%	1800	15.8	19.7	31.3	35.0	38.8	36.1	25.3	10.9	42.0	39
75%	2150	13.1	41.6	42.7	45.2	48.1	46.2	38.5	23.4	52.6	48
100%	2900	19.6	47.2	49.8	51.4	53.6	51.7	45.0	30.6	58.4	54
Sound Data for CRCW-24		Sound Pressure — LpA, free field (dBA) in a 146.91 ft. <sup>2</sup> (4.16 m <sup>3</sup> ) room at 3.28 (1.0 m) distance									
Fan Speed %	Airflow (SCFM)	63	125	250	500	1000	2000	4000	8000	Total dBA	NR Value
50%	4100	29.4	42.5	46.6	48.6	52.3	52.5	41.5	26.1	57.0	54
75%	5000	34.9	49.7	57.3	59.7	62.8	60.5	56.0	40.3	67.0	63
100%	5800	43.0	52.6	61.5	64.0	67.0	64.2	59.6	45.8	71.1	67

NOTE: All sound testing is performed in accordance with ISO 9614-2 Determination of Sound Power Levels. ISO 9614-2 specifies a method for measuring the component of sound intensity that is normal to a measurement surface. The measurement surface is chosen to enclose the noise source(s) so that the sound power level can be determined.

6. Dimensional Data

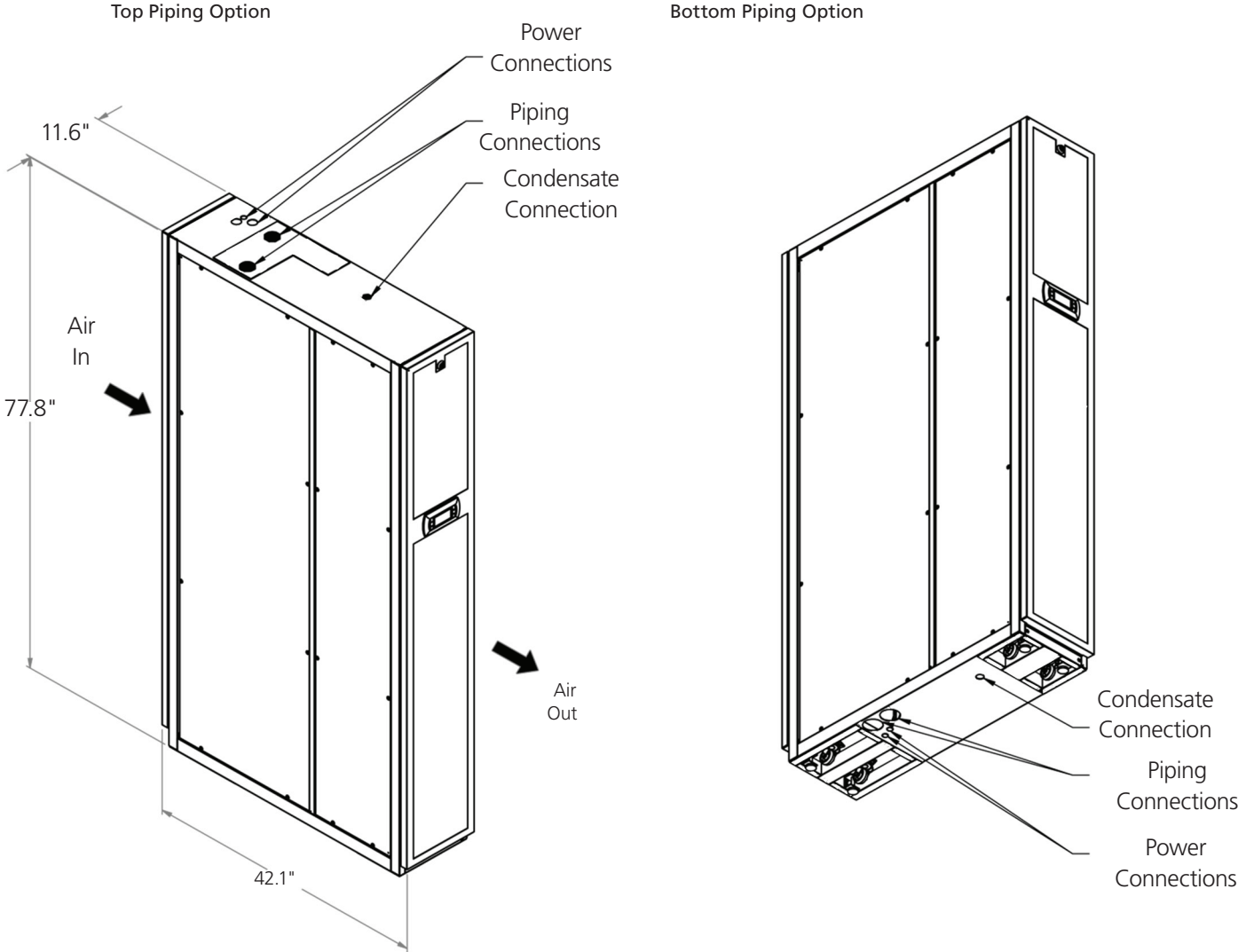


Figure 6-1a. Size and piping options, CRCW-12.

## Side-Diverted Front Panel Piping Option, CRCW-12

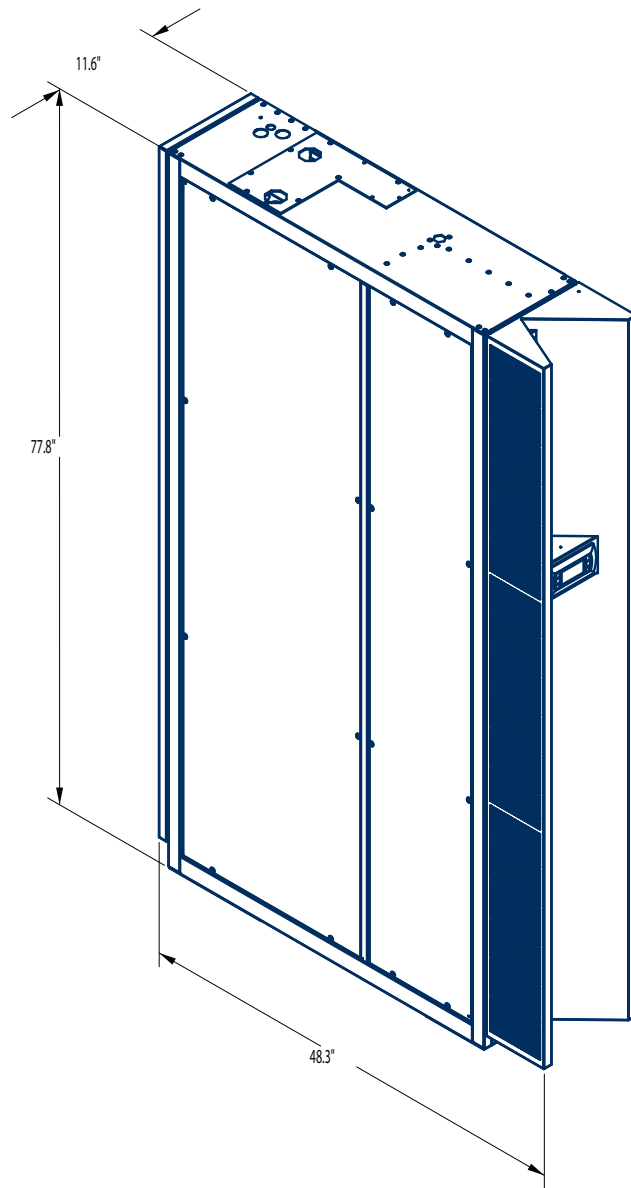
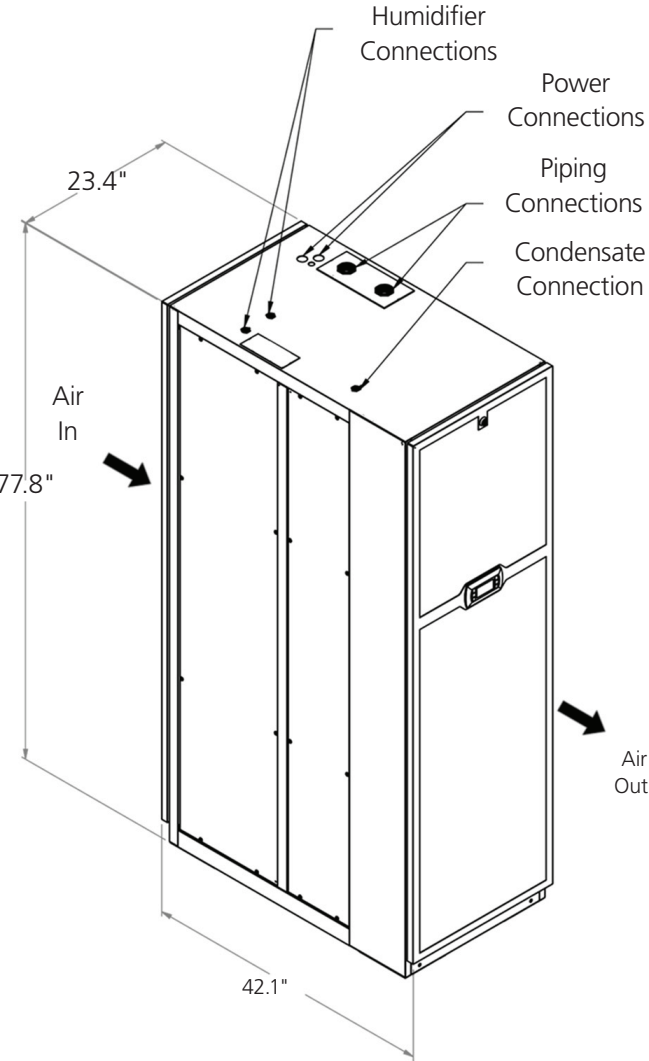


Figure 6-1b. Size and piping options, CRCW-12.

Top Piping Option



Bottom Piping Option

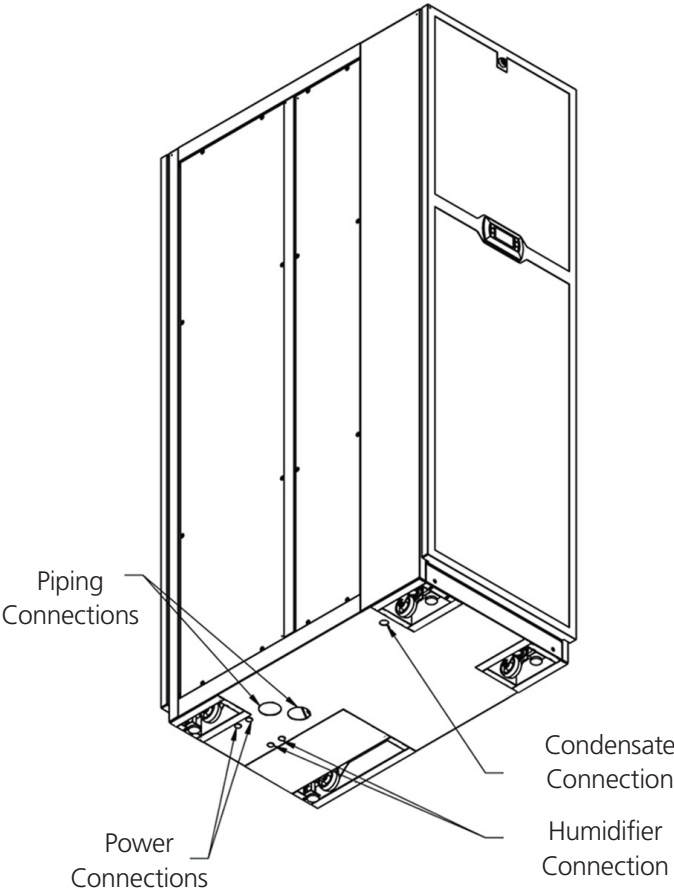


Figure 6-2a. Size and piping options, CRCW-24.

### Side-Diverted Front Panel Piping Option, CRCW-24

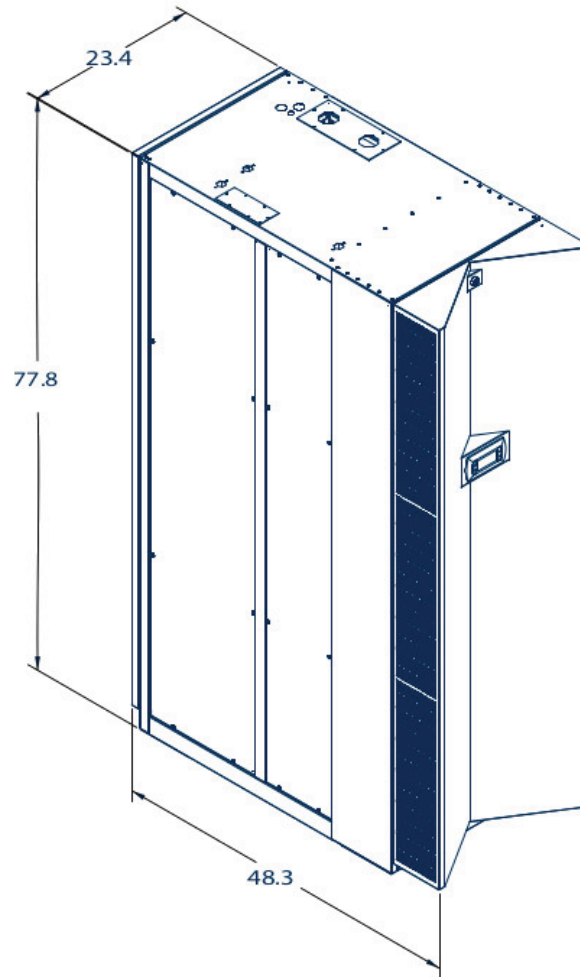


Figure 6-2b. Size and piping options, CRCW-24.



## 7. Product Features

Table 7-1. Product features.

Features	Part Numbers	
<b>Cabinet</b>	<b>CRCW-12</b>	<b>CRCW-24</b>
Galvanized Steel, Black Power-Coated Finish	Standard	Standard
<b>Air Pattern and Filtration</b>		
Front Discharge	Standard	Standard
Front Diverted Plenum Discharge	Optional	Optional
Permanent Washable Filters	Standard	Standard
<b>Mechanical Components</b>		
Backward Inclined, Plenum-Style Fan, with an EC Motor	Standard	Standard
Chilled Water Cooling Coil	Standard	Standard
Piping Configuration (Top or Bottom)	Selectable*	Selectable*
Condensate Pump	Standard	Standard
2-Way Modulating Chilled Water Control Valve	Standard	Standard
3-Way Modulating Chilled Water Control Valve	Optional	Optional
Electrode Steam Condenser Humidifier	N/A	Optional
<b>Electrical System</b>		
Automatic Dual Power Transfer Switch	Optional	Optional
Remote Stop/Start Controls	Standard	Standard
Main Power Switch	Standard	Standard
<b>E<sup>2</sup> Microprocessor Controller</b>		
A/C Grouping pLAN Interface	Optional	Optional
BMS Interface	Optional	Optional
Common Alarm, Dry Contact	Standard	Standard
<b>Optional Accessories</b>		
Mechanical Flow Switch	Optional	Optional
Differential Temperature Flow	Optional	Optional
Smoke Detection	Optional	Optional
Firestat	Optional	Optional
Remote Water Detector	Optional	Optional
<b>Code Conformance</b>		
ETL Conformance Compliance to UL® 1995 Standard	Standard	Standard
CAN/CSA C22.2 No. 236	Standard	Standard

\*NOTE: Piping connection location to be specified at time of order.

### 8. Product Guide Specifications

#### SUMMARY

This specification describes requirements for a precision environmental control system. The Cold Row CW is a row-based cooling system that provides precision temperature control (and humidity control for the 24" models) for computer rooms, or rooms containing telecommunications or other highly sensitive heat load equipment, where continuous 24 hours a day, 365 days a year air conditioning is required. Designed with both front and rear access, Cold Row CW systems require minimum floor space. The supplied system has ETL Certification. The part numbers are CRCW-12 and CRCW-24.

#### DESIGN REQUIREMENTS

The environmental control system is a Cold Row Chilled Water (CW) factory-assembled unit. The unit is designed for a row-based installation with removable front and rear access panels. No allowance for side service access is required, however, removable side access panels are provided for additional access.

Cold Row CW units are especially adapted for both raised and non-raised floors. The air handling system is specifically designed for high sensible heat ratio. Each system is capable of handling \_\_\_CFM. The unit shall have the cooling capacity of \_\_\_BTU/H, and the sensible cooling capacity of \_\_\_BTU/H based on entering air condition of \_\_\_°F (°C) dry bulb and \_\_\_°F (°C) wet bulb. The main fan motors shall be \_\_\_HP. The unit shall have a power supply of \_\_\_volts.

#### QUALITY ASSURANCE

The manufacturer will maintain a set of international standards of quality management to ensure product quality. Each system will be subjected to a complete operational and functional test procedure at the factory before shipment.

#### CABINET

Access panels must be fabricated from 18-gauge galvanized steel and must be securely fastened to the 10-gauge base and 16-gauge top plates, fabricated from galvanized steel. Both must be painted with a 2-ply epoxy finish to match and to protect from corrosion. The main unit color shall be satin black. Armaflex® elastomeric thermal insulation must be used to insulate the cabinet, block noise, and prevent damage from vibration. Casters and leveling feet shall be included to ease the installation and level the equipment with existing IT solutions.

#### AIRFLOW PATTERNS

All units must be designed using a front discharge with a rear return airflow pattern. An optional plenum with a front diverted discharge pattern is available.

#### AIR FILTRATION

All units must be equipped with permanent washable filters. These filters must consist of an open cell structured polyurethane foam with a roll-formed 3000 series aluminum frame. Filters shall meet both UL® 900 and UL 94 HF-1 standards.

#### MECHANICAL COMPONENTS

##### BACKWARD-INCLINED, PLENUM-STYLE FAN, WITH AN EC MOTOR

The blowers must be backward-inclined, plenum-style fans with an electronically commutated (EC) motor, for maintenance-free operation. The motor must include: integrated electronic control board and direct microprocessor control signaling for fan speed control, soft-starting capabilities, and integrated current limitations. Each fan must be low noise, low vibration manufactured with an anti-corrosive aluminum impeller. Each fan impeller must be dynamically and statically balanced in two planes to minimize vibration during operation.

### CHILLED WATER COOLING COIL

The coil must be constructed of seamless drawn copper tubes, mechanically bonded to tempered aluminum fins with enhanced fin design for maximum heat transfer, and mounted in a stainless steel condensate drain pan. The coil must be designed for a maximum of 500 ft./min. face velocity. The water circuit will be designed to distribute water into the entire coil face area.

### PIPING CONFIGURATION

Top piping: When top piping is specified, the Cold Row CW units must be provided with connections for both chilled water piping and condensate discharge on the top of the cabinet.

Bottom piping: When bottom piping is specified (for example, raised floor applications), the Cold Row CW units must be provided with connections for both chilled water and condensate pump discharge through the bottom of the cabinet.

### CONDENSATE PUMP

The Cold Row CW must include a factory-wired and installed, in-pan condensate pump. The condensate pump must have the capacity of 40 gal/hr. at 6 ft. of lift with a maximum shutoff (head) of 12 ft. The condensate pump must be piped with either top or bottom discharge connections, to remain consistent with top or bottom chilled water piping connections.

### 2-WAY (STANDARD)

A 2-way modulating valve rated for a maximum 400 psig w.w.p. must be factory piped and wired. The 2-way chilled water modulating valve will automatically meter the flow of chilled water to the cooling coil in response to a proportional signal (0–10 VDC) provided to the valve by the microprocessor controller w.w.p.

### 3-WAY (OPTIONAL)

The water circuit must include a factory-mounted, 3-way modulating (0–10 VDC) control valve. Design pressure must be 400 psig.

### STEAM-GENERATING HUMIDIFIER FOR 24" CABINET DESIGN (CRCW-24)

The humidifier must be a self-contained, steam-generating electrode type, using a plastic disposable cylinder with full probes, connected to electric power via cylinder plugs that slide onto the electrode pins. The electrode pins must be constructed from expanded low carbon steel, zinc plated, and dynamically formed for precise current control. The humidifier assembly must include an integral fill cup, fill and drain valves, and associated piping.

The canister must be designed to collect the mineral deposits in the water and provide clean, particle-free steam to the air stream, reducing maintenance cost.

The microprocessor control must maintain humidifier operation through fill and drain cycles based on the water conductivity. Overflow and loss of flow protection shall be provided along with a manual drain switch. A high water alarm with built-in time delay shall provide an indication to change canister. The humidification system must not require cleaning maintenance during the cylinder life.

The humidifier must discharge steam at 212 degrees F and atmospheric pressure. It must be capable of operating with water in the range of 200 to 1500 micromhos. The steam must be introduced into the air stream, after the evaporator, by a calibrated discharge tube designed to equally distribute the steam to the air stream without condensation. The humidifier must have a capacity of 5 lb./hr.

A factory-wired and installed humidifier drain pump must be installed. This pump is designed to operate with the higher condensate temperatures caused by the flush and drain cycle of the electrode canister humidifiers. The humidifier drain line will be connected to the main condensate line prior to exiting the cabinet.

### DEHUMIDIFICATION CYCLE

The Cold Row CW unit must have a dehumidification control mode. During dehumidification demand, the control mode must permit chilled water valve operation and EC motor speed control to condense moisture on the cooling coil.

## Chapter 8: Product Guide Specifications

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### ELECTRICAL SYSTEM

The electrical system must conform to National Electrical Code (NEC) requirements. In accordance with NEC Class II requirements, the control circuit must be 24 volts AC wire, and control circuit wiring must not be smaller than 18 AWG. All wiring must be neatly wrapped, or run in conduit, or cable trays, and routed in bundles. Each wire must end with a service loop and be securely fastened by an approved method. Each wire in the unit must be numbered for ease of service tracing.

All electrically actuated components should be easily accessible from the front of the unit without reaching overexposed high-voltage components or rotating parts. Each high-voltage circuit should be individually protected by circuit breakers, or manual motor starters, on all three phases. The blower motor must have thermal and short-circuit protection. Line voltage and 24-volt control circuit wiring must be routed in separate bundles. The electric box must include all the contactors, starters, fuses, circuit breakers, and terminal boards required for operation of the Cold Row unit. It must also allow for full service via front and rear access panels.

### AUTOMATIC DUAL POWER TRANSFER SWITCH (OPTIONAL)

Two individual main power input disconnect switches will be provided, one for each incoming power source. If the primary power fails or a phase loss/imbalance occurs, the automatic transfer switch transfers power to the secondary power source. Once the primary power has been restored, the transfer switch automatically shifts the power load back to the primary power. The transfer time from one source to the other is user adjustable to allow staging or sequence restart of load.

In addition to the automatic transfer switch function, the local controller display will indicate which power source has failed. This indication is a visual depiction that allows the user to determine the status of the input source. This status can also be conveyed thru the BMS serial communication link.

### REMOTE STOP/START CONTACTS

Included in the system's electrical control circuit must be a 2-pin terminal connection for remote stop/start of the Cold Row CW air conditioner by remote source.

### MAIN POWER SERVICE SWITCH

The Cold Row CW must have a unit-mounted main power service switch.

## E<sup>2</sup> Series Controller Description

### GENERAL

The advanced microprocessor based E<sup>2</sup> Series controller must be equipped with flexible software that meets the specific needs of the application. The setpoints must be default and their ranges must be easily viewed and adjusted from the user interface display. The program and operating parameters must be permanently stored on a non-volatile system in case of power failure.

The controller must be designed to manage temperature and relative humidity (RH) levels to a user-defined setpoint via control output signals to the Cold Row CW unit. Control parameters have variable outputs from 0 to 100% of the full rated capacity.

The controller must receive inputs for measurable control conditions (temperature, relative humidity, and dew point) via return air or room-mounted sensors. The internal logic will then determine if the conditions require cooling, humidification, or dehumidification. Control setpoints must be established to maintain design conditions of the installation. The controller will respond accordingly to changes in these conditions and control the output/demand for the appropriate mode of operation until user-defined conditions are achieved.

### FIELD CONFIGURABLE

The program for the E<sup>2</sup> Series controller must be field configurable, allowing the operator the capability of selecting control setpoints specific to the application. Operator interface for the E<sup>2</sup> controller is provided via a door-mounted user interface display panel. The display panel must have a backlit LCD graphical display and function keys, giving the user complete control and monitoring capability of the precision cooling system. The menu-driven interface should provide users with the ability to scroll through and enter various menu screens.

### **PASSWORD PROTECTION**

Access to the Info Menu, Alarms Log, and the ability to monitor room conditions must be allowed without the use of a password. Modifications to the control setpoints require the use of a password. The controller shall be programmed to recognize predetermined security levels before allowing access to display screens containing critical variables. Three secured menu levels (Control, Service, and Factory) will support unique passwords that must be entered to access the menu screens so only authorized personnel may perform modifications to the settings.

### **RESTORABLE PARAMETERS/FACTORY DEFAULTS**

Upon initial startup, the Cold Row CW system must operate using the setpoints programmed by the factory. The customer may enter new operating parameters in the Control menu and the system will then operate accordingly. The new setpoints may be stored as "Customer Default Setpoints." The primary setpoints entered by the factory still remain stored in the controller's memory as "Factory Setpoints." The setpoints for the system may be readjusted in the Control menu at any time. If necessary, the customer may restore the setpoints back to the Customer Default setpoint values or to the original factory (primary) setpoint values.

### **TIMER FEATURE**

The timer must allow the user to set up an operating schedule to automatically scale back or shut down the air conditioner during low demand or unoccupied periods. This is an energy-saving feature offering the user the ability to create an operating schedule tailored to the needs of the building. An evening (night-setback) schedule may also be created, allowing the Cold Row unit to operate at night with relaxed temperature/humidity setpoints and offsets.

### **A/C GROUPING PRIVATE LAN (pLAN) OPERATION (OPTIONAL)**

Multiple Cold Row CW system controllers must be able to connect (grouped) to a pLAN local network, allowing the communication of data and information from each controller to a central control terminal or lead controller. The lead controller display screens monitor and adjust group control variables for the individual system controllers. Each E<sup>2</sup> controller connected to the pLAN network must be identified with its own unique address.

Multiple Cold Row CW units consisting of up to eight precision air conditioners equipped with like controllers may be controlled and monitored via the E<sup>2</sup> series controller. With multiple Cold Row CW units, each unit can selectively be configured as "Active" to operate as a primary A/C, "Capacity Assist" for staged operation, or as "Standby" to come on-line in case of a failed air conditioning unit to ensure continuous availability. The controller may also be configured to rotate units with timed duty cycling to promote equal run-time and ensure that each Cold Row CW unit within the rotating group is operationally exercised on a periodic timed basis.

### **BUILDING MANAGEMENT SYSTEM (BMS) INTERFACE (OPTIONAL)**

The E<sup>2</sup> series controller incorporates a communication interface port that can be field connected through a serial interface to a BMS via Modbus, BACnet, SNMP, or HTTP as configured by the factory. A controller interfaced to a network must be configured for BMS communication.

### **ALARMS**

Alarm conditions activate a red LED indicator that backlights the alarm function key. As an option, an alarm condition may also be enunciated by an audible alarm signal. An alarm is acknowledged by pressing the alarm key. This calls up alarm display screens that provide a text message detailing the alarm conditions. After an alarm condition is corrected, the alarm can be cleared by pressing the alarm key.

### **SMALL BEZEL DISPLAY PANEL**

The small bezel user interface display panel features an easy-to-read, backlit liquid-crystal alphanumeric display equipped with contrast adjustment and LED illuminated function keys. The screens that appear on the user interface display panel present data that originates from the controller I/O module. The controller is operated via a 6-key menu-driven loop structure and offers an alarm log plus four different interface menu levels to the operator: Information, Control, Service, and Factory. These menus permit the user to easily view, control, and configure operating parameters for the Cold Row unit.

## Chapter 8: Product Guide Specifications

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### OPTIONAL ACCESSORIES

#### MECHANICAL FLOW SWITCH

A flow switch (shipped loose) must activate a loss of flow alarm if chilled water flow is interrupted.

#### DIFFERENTIAL TEMPERATURE FLOW (OPTIONAL)

A factory-mounted and wired temperature sensor for inlet and outlet water temperatures must permit a loss of flow alarm if the temperature difference is within 1° F (adjustable) during chilled water valve operation.

#### SMOKE DETECTION

A photo-electric smoke detector must be factory installed and wired in the evaporator section of the suction side of the evaporator blower. The air conditioner will shut down upon sensing smoke in the return air stream.

#### FIRESTAT

The air conditioner must be provided with a factory-wired and mounted firestat. The firestat will shut down the air conditioner upon sensing a high return air temperature.

#### REMOTE WATER DETECTOR: SPOT TYPE

A remote, single-point water and leak detector must be factory supplied and ship separately for field installation. Upon sensing a water leak, the normally closed water detector control circuit shall open, thereby shutting down the Cold Row CW unit's water-producing components.

#### REMOTE WATER DETECTOR: STRIP TYPE

A 20-ft. long remote strip/cable type water and leak detector must be provided for remote field installation. Upon sensing a water leak, the normally closed water detector control circuit shall open, thereby shutting down the Cold Row CW unit's water-producing components.

#### CODE CONFORMANCE

The unit must be designed and built to conform to UL® STD 1995, certified to CAN/CSA C22.2 No. 236. and listed with ETL.



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